

## WHAT IS CLAIMED IS:

1. A minute object manipulating apparatus comprising:

5 a tool which manipulates a manipulation target object;

observation means capable of changing a magnification for observing the manipulation target object and said tool;

10 display means for displaying magnified images of the manipulation target object and said tool, which are observed by said observation means;

command input means for causing an operator to input a manipulation command signal of said tool;

15 gain arithmetic means for deciding a driving gain to drive said tool on the basis of the magnification of said observation means and image information on said display means; and

20 control means for controlling driving of said tool on the basis of the driving gain and the manipulation command signal.

2. The apparatus according to claim 1, wherein said observation means is a microscope capable of continuously changing the magnification.

3. The apparatus according to claim 1, wherein said 25 gain arithmetic means decides the driving gain so as to ensure a substantially predetermined relationship between an amount of the manipulation command signal

from said command input means and a moving amount of a distal end of said tool displayed on said display means independently of the magnification of said observation means and a magnifying display adjustment ratio of the image on said display means.

4. The apparatus according to claim 1, wherein said gain arithmetic means decides the driving gain in proportion to a reciprocal of a magnification obtained by multiplying the magnification of said observation means and a magnifying display adjustment ratio of the image on said display means.

5. The apparatus according to claim 1, further comprising storage means for storing tool driving information desired by the operator,

15 wherein said control means controls driving of said tool on the basis of the driving gain, the manipulation command signal, and the tool driving information in said storage means, which is desired by the operator.

20 6. The apparatus according to claim 1, further comprising storage means for storing tool driving information desired by the operator,

wherein said gain arithmetic means decides the driving gain in proportion to a reciprocal of a magnification obtained by multiplying the magnification of said observation means and a magnifying display adjustment ratio of the image on said display means,

and an amount of the tool driving information in said storage means, which is desired by the operator.

7. The apparatus according to claim 1, further comprising visual control means for controlling said  
5 tool on the basis of the image information on said display means to automatically execute a job given by the operator.

8. The apparatus according to claim 1, wherein when the manipulation target object or said tool moves out  
10 of an image visual field of said display means, said control means automatically decreases one of the magnification of said observation means and the magnifying display adjustment ratio of the image on said display means, thereby synchronously increasing  
15 the driving gain of said tool.

9. A minute object manipulating method wherein a tool is driven and controlled on the basis of a magnification of observation means capable of changing the magnification for observing a manipulation target  
20 object and the tool, image information on display means for displaying magnified images of the manipulation target object and the tool, which are observed by said observation means, and a manipulation command signal of the tool, which is input by an operator, so as to  
25 ensure a substantially predetermined relationship between an amount of the manipulation command signal from command input means and a moving amount of a

distal end of the tool displayed on the display means independently of the magnification of the observation means and a magnifying display adjustment ratio of the image on the display means.

- 5 10. A manipulation method for a minute object manipulating apparatus comprising a tool which manipulates a manipulation target object, observation means capable of changing a magnification for observing the manipulation target object and the
- 10 tool, and display means for displaying magnified images of the manipulation target object and the tool, which are observed by the observation means, comprising:
- a command input step of causing an operator to input a manipulation command signal of the tool;
  - 15 a gain arithmetic step of deciding a driving gain to drive the tool on the basis of the magnification of the observation means and image information on the display means; and
  - a control step of controlling driving of the tool
  - 20 on the basis of the driving gain and the manipulation command signal.